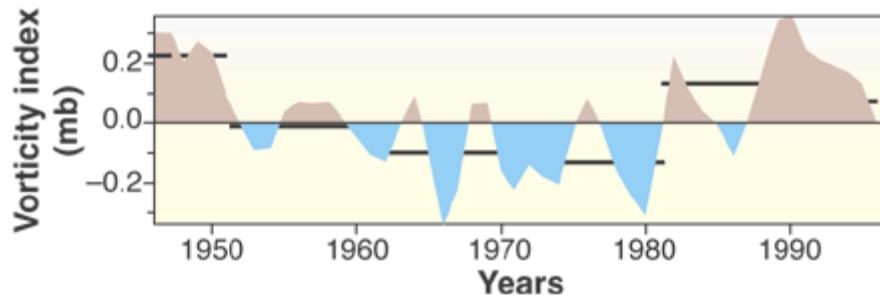


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The Changing Arctic  
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In my introduction, I will briefly describe the Arctic atmosphere-land-ocean system and discuss some of the linkages between the components of this system. The main body of my presentation will then consist of three parts:

1. *Air-sea ice-hydrology interactions and decadal scale variability.* This will be a review of earlier published results (eg, Slonosky et al. 1997; Venegas and Mysak 2000) analyzing the variability found in long records of the sea ice concentration and atmospheric sea level pressure. Natural variability on decadal and interdecadal timescales will be identified.
2. *Patterns of Arctic Ocean circulation and the NAO.* Here a brief discussion of the exciting results of Gobeil et al. (2001) on Atlantic water flow pathways revealed by lead contamination in Arctic sediments will be presented, and a perspective will be given on the implications for past and future upper ocean circulation patterns in relation to the NAO (Mysak, 2001; see also the two figures from this last reference, reproduced below).
3. *Air-ice sheet-land-ocean interactions.* The large-amplitude, high-latitude glacial climate fluctuations now known as Dansgaard-Oeschger cycles, involving both rapid (decadal) and slow (millennial) changes, have now been well documented in Greenland ice sheet cores (Dansgaard et al. 1984) and in North Atlantic ocean sediment cores (Bond and Lotti 1995). Wang and Mysak (2001) have recently attempted to explain these cycles in terms of ice sheet-THC interactions using an intermediate complexity climate model. A warm climate analogue of such interactions involving iceberg discharge from the Greenland ice sheet will be presented, and a new feedback loop will be shown that characterizes centennial scale climate fluctuations that have been observed during the recent Holocene.



**Figure 1.** Multiple phases. Annual mean vorticity index for the central Arctic Ocean computed from sea level pressure data. Brown (blue) regions show positive (negative) phases of decadal variability. The heavy horizontal black lines show decadal means. Also evident is a multidecadal (40- to 60-year) oscillation , with mainly positive phases of the vorticity index in the late 1940s to early 1950s and late 1980s to 1990s and a mainly negative phase in the 1950s to 1980s. From Mysak (2001)



**Figure 2.** The two paths for the Transpolar Drift Stream. Clockwise (blue curve) and anticlockwise (red curve) paths are associated with negative and positive phases, respectively, of the vorticity index (first figure). From Mysak (2001).

## **References**

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